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ABSTRACT:

Saturn's Far-Ultraviolet Aurora

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Saturn's far-ultraviolet aurora was first observed just sixteen years ago by Pioneer 11, and has since been observed by IUE, Voyager UVS, and most recently by the Hubble Space Telescope spectrographs and cameras. WFPC2/HST images of Saturn's far-ultraviolet aurora, obtained in October 1994 and October 1995, show auroral emissions confined to a narrow band of latitudes near Saturn's north and south poles. These images provide our best indications of the spatial distribution of the auroral emissions. The aurorae are most prominent near the dawn limb in a pattern that is possibly fixed in local time. Observing geometries favored the north polar regions in 1994 and gave equal access to north and south poles in 1995. Both the north and south auroral zones overlie stratospheric polar hoods that are dark at UV wavelengths. Limiting sensitivities were roughly 10 kR in the far-ultraviolet (F160WB and F160WB+F130LP) exposures which isolated H δ Lyman and Werner band and atomic hydrogen Ly- α emissions. The auroral features have been modeled as electron-excited H δ emissions distributed along Saturn's magnetic field lines in order to constrain the longitude, latitude, and height distributions in the WFPC2 images. The dawn-fixed features are consistent with a recent re-analysis of Voyager observations of the SKR by Galopeau et al. (1996), and suggest that K-H instabilities at the solar wind / magnetosphere boundary are likely an important component in the mechanism producing the dawn-fixed auroral features.